

### **REMARKS**

Applicant would like to thank the Examiner for the careful consideration given the present application. Favorable reconsideration of the subject application is requested in view of the comments made herein.

Claims 1 and 16-17 are amended. No new matter is entered.

Claims 16-21 were rejected under 35 U.S.C. 112, first paragraph. Specifically, the Examiner alleges that the specification "discloses only an example wherein the distance separating the lower and upper mirrors may be 70 nanometers (pg 8)." The Examiner is correct that the specification does discuss, on page 8, that 70 nanometers is one possible example distance separating the lower and upper mirrors. The example on page 8, lines 24-26 describes that the active layer can be 30 nanometers and the absorbent layer can be 40 nanometers, for a total width of 70 nanometers.

However, the specification as originally filed also describes on page 7, line 15, that the active layer can be up to 50 nanometers. Combined with the described 40 nanometer absorbent layer, the distance separating the lower and upper mirrors would be 90 nanometers (i.e.,  $50 + 40 = 90$ ). Additionally, the specification as originally filed further describes on page 13, line 6 that the active layer can be 40 nanometers. Combined with the described 40 nanometer absorbent layer, the distance separating the lower and upper mirrors would be 80 nanometers (i.e.,  $40 + 40 = 80$ ). Thus, claim 16 has been amended to state, in pertinent part, "wherein the distance separating the first mirror from the second mirror is ~~equal to or less than about 100~~ in the range of about 70 nanometers to about 90 nanometers." Support can be found in the original specification as described above. Accordingly, claim 16 is now believed to be in condition for allowance. Withdrawal of the rejection is requested.

Claims 16-21 were rejected under 35 U.S.C. 112, second paragraph. Specifically, the Examiner alleges that use of the relative terminology "about" renders the claims indefinite. Respectfully, it is submitted that the Examiner is in error. Per MPEP 2173.05(b), "[t]he fact that claim language, including terms of degree, may not be precise, does not automatically render the claim indefinite under 35 U.S.C. 112, second paragraph." Instead, "[a]cceptability of the claim language depends on whether one of ordinary skill in the art would understand what is claimed, in light of the specification." For example, "[i]n determining the range encompassed by the term

“about”, one must consider the context of the term as it is used in the specification and claims of the application.”

In the instant application, the term “about” is used a number of times to describe a distance (i.e., “about 790 nm,” etc.). Thus, one of ordinary skill in the art would understand what is being claimed in claims 16-21, including the claimed range of values, upon reading the specification. Accordingly, the word “about” remains in claims 16-21. If the Examiner disagrees, the Examiner is requested to explain how, in light of the use of the term “about” within the specification, one of ordinary skill in the art would understand would not be able to understand what is claimed, as per MPEP 2173.05. Withdrawal of the rejection is requested.

Claims 1-3, 9-10 and 12-15 were rejected under 35 U.S.C. 103(a) as being unpatentable over the cited publication entitled “High-Frequency, Long-Wavelength Resonant-Cavity-Enhanced InGaAs MSM Photodetectors” (hereinafter “Strittmatter”) in view of U.S. Patent No. 5,945,720 to Itatani. For the following reasons, the rejection is respectfully traversed.

Claim 1 has been amended to state, in pertinent part, “a support; reflecting means superposed on a first face of [[a]] the support to form a first mirror for a Fabry-Pérot type resonant cavity.” Claim 1 has also been amended to state, in pertinent part, “a layer of material that does not absorb ~~said~~ the incident light, the layer of material being disposed on the reflecting means, [and] an active layer made of a semiconducting material absorbing incident light, the active layer being disposed on the layer of material that does not absorb the incident light.” Claim 1 has been further amended to state, in pertinent part, the geometric dimensions of the conducting strips being determined to form a second mirror for the Fabry-Pérot type resonant cavity at the interface between the electrodes network and the active layer.” Support can be found in the original specification as filed in at least page 7, line 27 through page 8, line 21 and Figure 1. Neither Strittmatter nor Itatani, either alone or in combination, disclose such structure.

The Examiner alleges that Strittmatter teaches, via Figure 4, that light is incident through the front, through the electrodes. Regardless, the electrodes of Strittmatter do not constitute a top mirror, as explained below.

Indeed, Strittmatter indicates on page 147, lines 20-24 that “*the high speed behavior is comparatively investigated for fully processed rear-illuminated RCE MSM detectors and for*

front-illuminated MSM detectors without the top Si/SiNx DBR.” It is thus clear from the passage that for the front illumination, the top Si/SiNx DBR is removed.

Furthermore, as page 146 describes the structure of Figure 1 to indicate that “*the highly reflecting top mirror is composed of the interdigitated Pt/Au electrodes and a Si/SiNx quarter wave stack acting as a reflector in the gap region between the contact fingers,*” it is clear that for the front illumination there is no top mirror (see also the caption of Figure 4).

On the contrary, in the invention as claimed, the light to be detected is incident onto the device through the electrodes network, and the geometric dimensions of the conducting strips are determined to form a second mirror for a Fabry-Pérot type resonant cavity at the interface between the electrodes network and the active layer. See amended claim 1. The second mirror is obtained by the combination of an electrodes network and an active layer. Thus, if one of the two elements is removed (as described in Strittmatter), there can be no second mirror.

Additionally, Strittmatter indicates (see end of page 145) that the device is illuminated through the InP substrate (i.e., through the rear as deduced from Figure 1) in order to avoid the loss of responsivity due to the blocking effect of the opaque interdigitated finger electrodes which occurs when the MSM is illuminated from the top. Therefore, Strittmatter does not teach nor suggest an illumination through the top mirror (i.e., through the front of the device), as claimed in independent claim 1.

Further, Itatani does not fulfill any of the deficiencies of Strittmatter. The Examiner alleges that Itatani teaches that space between electrodes is reduced and that the light is incident onto the electrodes. This arrangement is not the same as the one described in Strittmatter. Itatani only describes the incorporation of a Fabry-Pérot type resonator structure (see col. 10, lines 44-50) to obtain a wavelength selective absorption. In Itatani, the Fabry-Pérot type resonator does not improve the absorption. Thus, one of ordinary skill in the art would have no motivation to combine Strittmatter and Itatani.

In distinction, the invention as claimed has the behavior of a Fabry-Pérot type resonant cavity. A structure having the behavior of a Fabry-Pérot type resonant cavity is a structure that reflects about 100% of the incident light except for a small range of wavelength values (i.e., reflectivity equals about 0% at the resonance). Moreover, as stated on page 1, lines 8-17 of the specification as originally filed, for “an ultra-fast photo-detector (response time less than 1 ps)...

the target speed necessitates a short distance between electrodes (less than 100 nm) and that light is absorbed in a minimum volume."

Thus, the combination of Strittmatter and Itatani would not have lead a person of ordinary skill in the art to the present invention. Therefore, amended claim 1 is not rendered obvious by the combination of the teachings of Strittmatter and Itanani. Accordingly, claim 1 and its dependent claims 2, 3, 9, 10 and 12-15 are patentable over the prior art of record. Withdrawal of the rejections is requested.

Claims 4-6 and 7-8 were rejected variously under 35 U.S.C. 103(a) over Strittmatter in view of Itatani, U.S. Patent No. 5,663,639 to Brown, or U.S. Patent No. 6,528,827 to Henning. Neither Brown nor Henning teaches or suggest the limitations of which Strittmatter and Itatani are deficient, as described above with regard to claim 1. Therefore, since claims 4-6 and 7-8 depend from claim 1, they are patentable for the same reasons.

In consideration of the foregoing analysis, it is respectfully submitted that the present application is in a condition for allowance and notice to that effect is hereby requested. If it is determined that the application is not in a condition for allowance, the examiner is invited to initiate a telephone interview with the undersigned attorney to expedite prosecution of the present application.

If there are any fees resulting from this communication, please charge same to our Deposit Account No. 16-0820, our Order No. REG-37392.

Respectfully submitted,  
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